



Chemical and Material Risk Management Directorate

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# ***Closing the Loop: An Assessment of the Life Cycle of Beryllium-Containing Materials in the Department of Defense***

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Presentation to the Beryllium Health and Safety Committee

6 April 2011

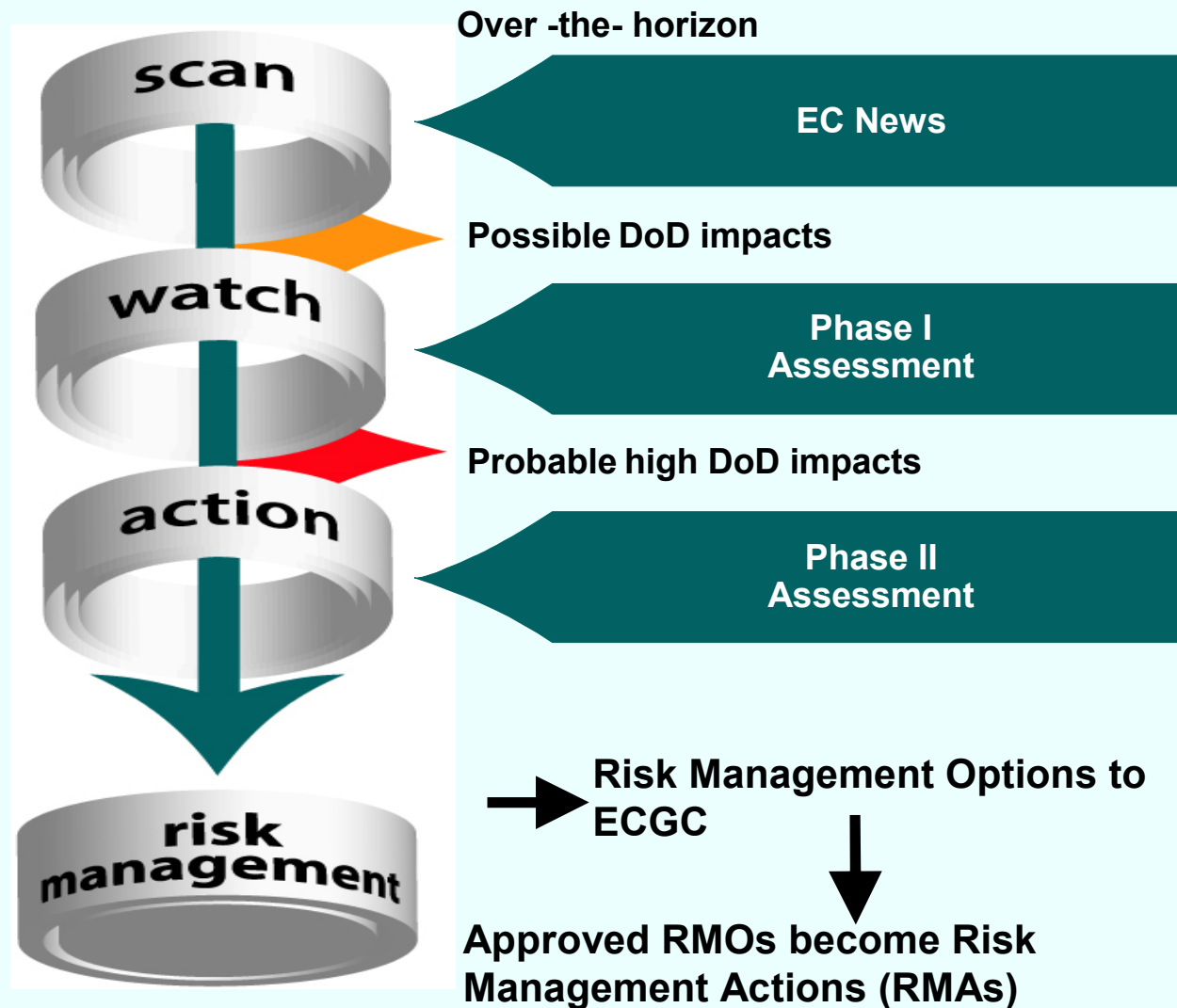
# ***Today's Presentation Outline***

- **Background**
- **Purpose**
- **Study Design**
- **Findings**
- **Recommendations**
- **Next Steps**

# ***Chemical & Material Risk Management Directorate***

- **Purpose:** To integrate science, technology, and policy to achieve a more sustainable future regarding the assessment, selection, and management of chemicals and materials within the DoD.
  - Facets: Acquisition ESOH, Chemical Management, Green Procurement, Emerging Contaminants (ECs)
- **Goals:** Proactively address future challenges; sustain the DoD mission; lower life cycle costs; drive innovation; avoid crises

# ***DoD's Scan, Watch, Action Process for ECs***



## ***Beryllium as an EC***

- **Be is an Action List EC**
  - Why? High risk of impacts to DoD resulting from changes in regulatory occupational exposure standards and limits
    - Impacts likely to ESOH, Readiness & Training, and O&M
  - Risk Management Options (RMOs) developed to address potential impacts

## ***This Study***

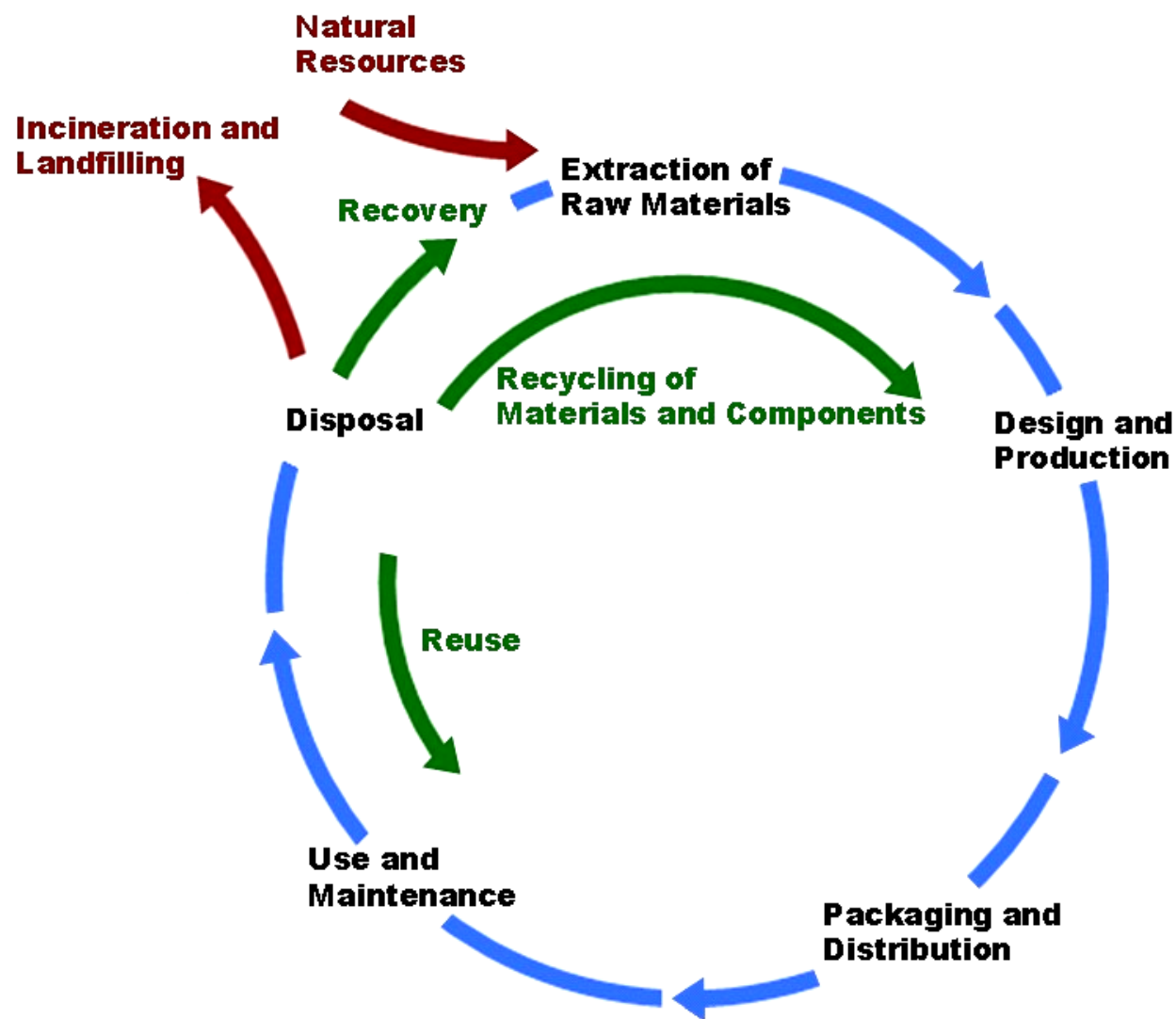
- **Study Purpose**

- Address Be RMO #3

- **Study Goals**

- Clarify and highlight gaps in **life cycle** knowledge by tracking DoD beryllium-containing materials through acquisition, purchase, use, maintenance, and end-of-life management
- Recommend opportunities to close these gaps

# ***Life Cycle of a Product***



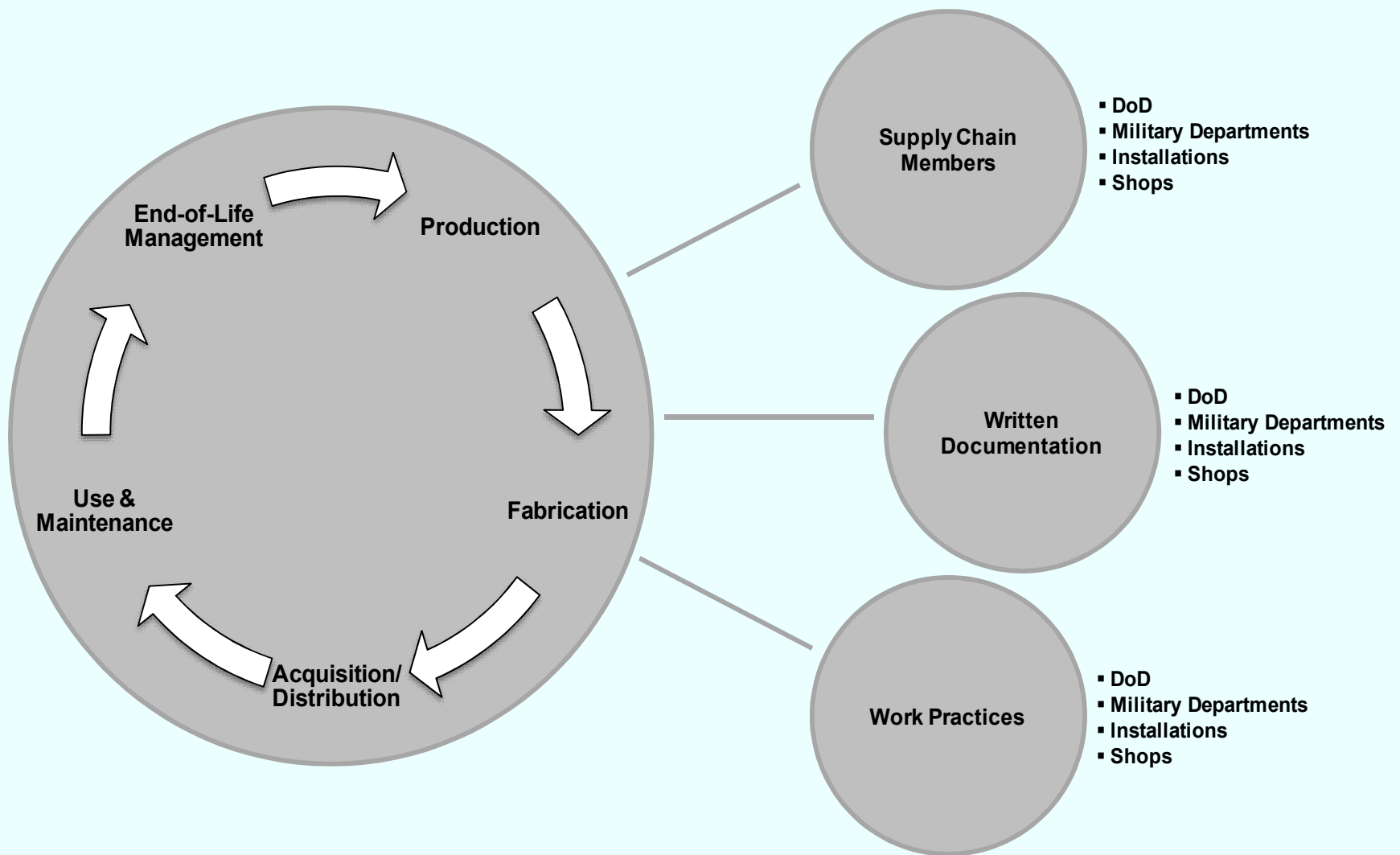
## ***Study Design***

- **Objectives:**

- Identify **supply chain members** who have role in DoD life cycle of Be-containing materials
- Review **written documentation** concerning management of Be-containing materials at each life cycle stage
- Conduct **case studies** that track select Be-containing materials used in DoD weapons systems and platforms through their DoD life cycle to **identify current practices** for Be-related activities



# Study Design

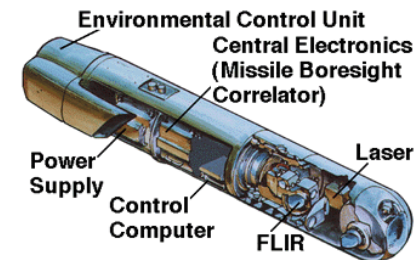
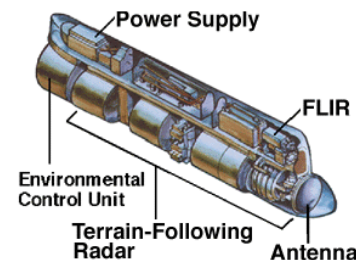


## ***Case Study***

- **Copper beryllium landing gear bushings**



- **Low altitude navigation and targeting infrared for night (LANTIRN) pod system**



## ***Findings***

- **Beryllium taxonomy is not comprehensive nor standardized**

Category	Reference	Description
Strategic, Critical Material	Strategic Materials Protection Board Report, December 2008	High purity beryllium metal
	DoD 4160.21-M, Defense Materiel Disposition Manual	Beryllium metal, as billets, and beryllium copper master alloy, as ingots
High Temperature Alloy	DoD 4160.21-H, Defense Scrap Yard Handbook	High temperature alloy group 62: Beryllium
Critical Alloy	Air Force T.O. 00-25-113, Technical Manual, Conservation and Segregation of Critical Alloy and Precious Metal Bearing Parts and Scrap	Group No. 62, Beryllium, QQ-C-530, QQ-C-533

## ***Findings***

	Production	Fabrication	Acquisition	Use & Maintenance	End-of-Life Management
Supply Chain Members	✓	✓	✓	✓	✓
DoD Written Documentation as a Strategic/Critical Material	✓	✗	✗	✗	✓
DoD Written Documentation as a Hazardous Material	N/A	✓	✓	✓	✓
Practices	✓	±	±	±	✗

## ***Findings***

	Production	Fabrication	Acquisition	Use & Maintenance	End-of-Life Management
Supply Chain Members	✓	✓	✓	✓	✓

## ***Findings***

	Production	Fabrication	Acquisition	Use & Maintenance	End-of-Life Management
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## ***Findings***

	Production	Fabrication	Acquisition	Use & Maintenance	End-of-Life Management
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## ***Findings***

	Production	Fabrication	Acquisition	Use & Maintenance	End-of-Life Management
Practices	✓	±	±	±	✗



## ***Recommendations***

- **Strategic Policy & Procedure Development**
  - Clarify and standardize the beryllium taxonomy
  - Encourage a DoD-wide Precious Metals and Strategic Materials Recovery Program
  - Ensure existing installation- and shop-level materials management policies and procedures contain instructions for safe handling and recovery of Be
  - Ensure full utilization of existing Be recovery and recycling facilities

## ***Recommendations***

- **Workforce Education & Training**
  - Ensure personnel responsible for end-of-life management are trained to identify recoverable quantities of strategic, critical materials per existing written policies and procedures
  - Develop training to ensure supply chain members are aware of a new DoD-wide Precious Metals and Strategic Materials Recovery Program

## ***Next Steps***

- **Resolve outstanding study questions**
  - Quantity of new scrap and old scrap generated at DoD?
  - Who implements the PESHE at U&M, EOL stages?
  - Army-specific and Navy-specific information?
    - landing gear bushings
    - LANTIRN (or similar)
  - Current Precious Metals Recovery Program training?
- **Present findings and recommendations to EC Steering Committee**

## ***Thank You***

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# ***Backup Slides***

## ***Emerging Contaminants Program Highlights***

- ❖ **Screened over 400 potential ECs**
- ❖ **Completed 25 Phase I Impact Assessments**
- ❖ **Completed 7 Phase II Impact Assessments**
  - Beryllium, lead, sulfur hexafluoride (SF6), hexavalent chromium, naphthalene, trichloroethylene (TCE), perchlorate, & RDX
- ❖ **54 Risk Management Options (RMOs) developed & turned into Risk Management Actions (RMAs)**

A finalist for Harvard's 2009 "Innovations in American Government" Award!

## ***EC Action List – current as of Jan 2011***

- ✓ **RDX (Cyclotrimethylenetrinitramine)**      explosive
- ✓ **Hexavalent Chromium (Cr<sup>6+</sup>)**      anticorrosive
- ✓ **Naphthalene**      component of jet fuel
- ✓ **Beryllium (Be)**      light metal special properties
- ✓ **Sulfur Hexafluoride (SF<sub>6</sub>)**      greenhouse gas 23000x  
GWP of CO<sub>2</sub>
- ✓ **Lead**      heavy metal used in munitions

✓ **Phase II Impact Assessment Completed & Risk Management  
Actions Underway**

## ***EC Watch List – current as of Jan 2011***

- ✓ Tungsten alloys
  - ✓ 1,4-dioxane\*
  - ✓ Nanomaterials\*
  - ✓ Perfluorooctyl sulfonate (PFOS)
  - ✓ Di-nitrotoluenes (DNT)
  - ✓ Nickel
  - ✓ Cadmium
  - ✓ Manganese
  - Cerium
  - Cobalt
  - Antimony
  - ✓ Perfluorooctanoic acid (PFOA)
  - Phthalates
  - ✓ Diisocyanates
  - ✓ TCE
  - Perchlorate<sup>1</sup>
- ✓ Phase I Impact Assessment completed
- \* Will be re-assessed

<sup>1</sup> Perchlorate was program's original EC – no Phase II assessment but RMOs developed and approved by ECGC